PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.

A New and Improved Apparatus for Developing the Sense of Vision, and Improving the Muscle Balance of the Eyes.

I, ERNEST REYNOLDS MADDOX, of 1, Redesdale Street, Chelsea, London, S.W. 3, a British subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to an apparatus, or instrument (hereinafter referred to as "instrument"), for improving binocular vision, and use in training the muscle balance of the eyes, and which provides, in the one instrument, for orthoptic tests and version, duction, fusion, stereoscopic, and the like, exercises for all excursions of the eyes.

The instrument according to this invention consists of, primarily, two picture carriers, adjustable one in relation to the other, and two lenses, so mounted as to form a binocular instrument which may be moved arcially in all directions about a point which closely corresponds with the bridge of the nose of the observer. The instrument may consist of two picture carriers mounted at one extremity of a bar, or plate, the other extremity of which is shaped to fit the bridge of the nose of the observer. A short distance from the shaped end of the bar are mounted two lenses in such a manner that the observer may view the said picture carriers through the lenses, as in a binocular instrument. By means of pressing the bar against the bridge of the nose, or against a suitably shaped plate with a ball joint, the picture carriers and lenses may be moved in all directions about arcs of circles whose centres closely correspond with the centre of the bridge of the nose of the observer.

It is found more convenient to provide an upstanding support, beneath which a pendant, or pendants, are hung by means of a joint, or joints, which allow for movement about the several horizontal axes, but which, preferably, prevent rotation about the vertical axis. At the lower extremity of the pendant, or pendants, two picture carriers are mounted so that they are adjustable for all horizontal movements, one in relation to the other, by means of slides, screws and, or, pivots. Near the upper extremity of the pendant, or pendants, two lenses are mounted in a horizontal position such that when a person rests his forehead upon the upstanding support his eyes will be in a position to use them as a binocular instrument, and view the picture carriers. The upstanding support is so shaped as allow for movement of the pendant, or pendants, picture carriers and lenses about the universal joint. By means of suitable attachments the pendant, or pendants, may be fixed in a vertical position.

One example of construction of the instrument according to this invention comprises a firm rectangular base, at one end of which is attached a rigid upstanding support inclined at an angle of about fifty five degrees to the horizontal, leaning towards the centre of the base and carrying at its upper end a horizontal rest for the forehead and bridge of the nose. Medially beneath the nose rest a universal joint is mounted, which is so constructed as to permit of free movement in all directions except rotation about its vertical axis, and carries a plate, or septum, (hereinafter referred to as "septum") extending down close to the base, and of a width equivalent to the width of the picture carriers, and set in the vertical plane which passes through the centres of the forehead and nose rest respectively. Two lenses are mounted in a horizontal position extending one on either side of the septum, to which they are attached, and in such a manner that when a person rests his forehead and bridge of the nose on the respective rests, he may use the lenses as a binocular instrument. The lower end of the septum carries two rods, or flats, extending horizontally on either side, between which two slides, of suitable material, are fitted, one on either side of the septum, being held in position by a screwed rod in such a manner that when the screwed rod is rotated the slides will move along the rods, or flats, in opposite directions. Two metal plates with their outer edges bent over so that small pasteboard cards will slide therein and remain fixed in position are attached to the slides by means of a central stud, or pivot, about which the plates may be rotated. A small handle is hinged to the front

[*Price* 1/-]

lower extremity of the septum, the other end being shaped to fit into a clip attached to the base in such a manner that the septum, together with the picture carriers and lenses, may be fixed in position vertically beneath the eyes of the person viewing.

A preferred method of construction is where the universal joint is replaced by a spindle which corresponds in length to the average width between the eyes and is mounted on small bearings on the upstanding support, underneath the forehead rest and extending on either side thereof. Pendants of narrow strip, or rod, are pivotted at either end of the spindle, and carry two lenses, one to each pendant respectively, and mounted horizontally, so that when a person rests his forehead upon the forehead rest he may use the lenses as a binocular instrument. At the base of each pendant are mounted two picture carriers, constructed in the manner previously described. The rear upper extremity of the septum is pivotted to the centre of the spindle and extends downwards medially between the two pendants. The lower extremity of the septum is slotted and carries a screwed rod which passes through the base of the two picture carries in such a manner that when the screwed rod is rotated the picture carriers, with their respective pendants, move in opposite directions about the pivots on the spindle. The screwed rod also inter-connects the two pendants and the septum so that they may be moved about the spindle and pivots in any direction and maintain their relative position. This method of construction allows the two lenses to maintain an identical relative focus for all movements of the septum and to correspond more closely with the excusions of the eyes.

When using the instrument the representations of suitable objects may be placed in the picture carriers and adjusted in the manner provided, and heretofore described, until fusion is obtained, when the septum, together with both picture carriers and lenses, may be pushed in one or more, directions by means of the handle and followed by the eyes, or the handle may be attached to the base in the manner described and duction, fusion and the like exercises carried out by means of the adjustments provided on the respective picture carriers, and by means of the screwed rod.

Dated this twelfth day of February, 1932.
E. R. MADDOX.

COMPLETE SPECIFICATION.

A New and Improved Apparatus for Developing the Sense of Vision, and Improving the Muscle Balance of the Eyes.

I, ERNEST REYNOLDS MADDOX, of 1, Redesdale Street, Chelsea, London, S.W. 3, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to an apparatus for exercising the muscles of the eyes, more particularly for improving and training binocular vision, ocular motility and concomitancy.

According to the present invention the apparatus comprises a support for locating it in relation to the user's eyes (for example a plate so shaped as to fit closely to the forehead and bridge of the nose), two lens carriers supported immediately in front of the eyes, and a frame pivoted to the support about an axis close to the user's eyes and provided with two picture carriers. Preferably, the frame is universally jointed to the support so that the pictures can be moved in various directions transverse to the line of sight, and the support aforesaid may conveniently be mounted on a stand.

In order that the apparatus may be used for performing orthoptic tests the two picture carriers are preferably made movable towards or away from one another, and one of them may be made movable vertically—that is, transverse to the interocular line—while in addition one of them may also be rotatable about the line of sight. Scales may be provided whereby the various movements may be measured—for example, they may be a scale of millimetres for measuring the lateral deviations, a scale of prism diopters for vertical deviation, and a scale of degrees for torsional deviations.

A prefered embodiment of the invention will now be described with reference to the accompanying drawings, in which

Figure 1 is a side elevation of the apparatus.

Figure 2 is a plan,

Figure 3 is a sectional elevation of the pivoted frame taken along the line III—III in Figure 1, and

Figure 4 is a section along the line IV—IV in Figure 3.

Referring to Figures 1 and 2, the stand comprises an angular frame having a horizontal upper portion 10 and a foot portion 12, together with a strut 14 pivoted to the frame at the junction between its two portions and capable of being clamped thereto by means of a clamping screw 16 A forehead rest 18 is fixed to the free end of the part 10 of the stand.

A frame, shown in detail in Figure 3, is pivoted to the forehead rest about a Hooke's joint 20 which is so situated that it is close to the bridge of the nose of a person applying his forehead to the rest 18 and midway between the pupils of his eyes. The frame consists of a septum 22 and a cross-bar 24 on which are mounted two picture carriers 26. Near its upper end the septum carries frames 28 for two lenses 30 of suitable focal length through which the observer views the pictures carried by the carriers 26. A small handle 32 is fixed to the septum to enable the frame to be conveniently manipulated. A hollow stem 34 is fixed to the centre of the cross-bar in line with the septum and within this stem 34 is mounted a plunger 36 which is urged downwards by a coil spring 38 within the stem. The plunger is provided with a stud 40 sliding in a slot 42 cut in the side of the stem. and a clamping nut 44 screwed on to the stud enables the plunger to be clamped in any position.

The protruding end of the plunger 36 slides in a channel-shaped guide 46 which is bent to the shape of an arc having its centre at the centre of the Hooke's joint 20. This guide 46 is pivoted to the part 12 of the stand about an axis which passes through the centre of the Hooke's joint 20, and a clamping nut 48 is provided whereby the guide 46 can be clamped in any adjusted position about this axis. Spaced holes 50 are provided along one half of the guide 46 and the plunger 36 can be engaged with any one of these holes as shown in Figure 3, or retracted from the holes so as to be capable of sliding along the guide 46, as shown in Figure 1.

The cross-bar 24 is a tube of square cross-section and within it is mounted a screw 52 one half of which has a right-hand screw-thread and the other half a left-hand screw-thread. There is a bearing 54 in the centre of the cross-bar for an unthreaded part of the screw, and the ends of the screw project beyond bearing caps 56 at the ends of the cross-bar and are provided with knobs 58 whereby the screw can be conveniently rotated. Threaded on the two halves of the screw are nuts 60 which are square in cross-section to fit the bore of the tubular cross-bar and the picture carriers 26 are secured to these nuts. One picture carrier, namely, the left-hand one in Figure 3, is fixed to its nut while the other one is mounted to rotate about a pivot 62 on a plate 64 secured to the nut by means of screws 66 as shown in Figure 4. By turning the knobs 58 the picture carriers can be moved towards or away from one another so as to vary the angle of convergence of the eyes viewing the pictures. The carriers 26 are grooved, as clearly shown in Figure 3, for the reception of stereograms or other pictures, and the right-hand carrier is provided with a pointer 68 reading against a fixed scale of degrees 70. This carrier is also provided with another pointer 72 reading against a millimetre scale 74 marked on the cross-bar. Thus, if a pair of stereograms are placed in the carriers and adjusted until fusion is obtained the lateral deviation can be read on the scale 74 and the torsional deviation on the scale 70. Vertical deviation can also be read on a scale printed on one of the stereograms and reading against the edge of the carrier.

To exercise the eye muscles for the purpose of improving motility the guide 46 may be fixed in the vertical plane by means of the nut 48, and the pivoted frame is swung up and down in the vertical plane, being guided by the plunger 36 riding within the guide. This, of course, exercises those muscles which move the eye vertically by clamping the guide 46 in a horizontal position the muscles which move the eyes horizontally can be exercised. By causing the plunger 36 to engage one of the holes 50 and unclamping the guide 46 so that it is free to rotate the pivotted frame is constrained to move in a conical path thereby enabling all the eye muscles to be exercised simultaneously.

In a modification the frame carrying the picture carriers and lenses is hinged or pivoted to the stand about a single axis transverse to the line of sight, for example, a horizontal axis. in which case the guide 46 and the plunger 36 may be dispensed with. According to a further modified form of the invention the lens carriers are fixed and the cross-bar supporting the picture carriers is supported from two parallel links separately jointed at their upper ends at points on the stand on either side of the lens carriers.

The lenses 30 are shown permanently held in the frames 28 but if desired these frames may be arranged so as to enable any one of a series of lenses to be readily slipped into them. Furthermore, the

cross-bar 24 may be made movable along the septum 22 towards or away from the lens holds.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what claim is :—

1. Apparatus for exercising the muscles of the eyes comprising in combination a support for locating the apparatus in relation of the user's eyes (for example a plate so shaped as to fit closely to the forehead and bridge of the nose), two lens carriers located in front of the eyes, and a frame supporting two picture carriers and pivoted to the support about an axis close to the user's eyes.

2. Apparatus according to Claim 1, wherein the support is mounted upon a stand.

3. Apparatus according to Claim 1 or Claim 2, wherein the two lens carriers are secured to the frame one on either side near its point of pivoting.

4. Apparatus according to any preceding claim, wherein the frame is universally jointed to the support so that the pictures can be moved in various directions transverse to the line of sight.

5. Apparatus according to any preceding claim wherein the two picture carriers are provided with means whereby they may be readily moved towards or away from one another.

6. Apparatus according to Claim 5, wherein at least one of the picture carriers is mounted so as to be rotatable at will about the line of sight.

7. Apparatus according to any of Claims 2 to 6, wherein an arcuate guide (for example, 46) is provided in which an extension of the frame can slide, said guide being pivoted to the stand about an axis passing through its centre and the point of pivoting of the frame to the stand, and being provided with means for locking it in any angular position about said axis.

8. Apparatus according to Claim 7, wherein means are provided for anchoring the extension of the frame to the guide at one of a number of different distances from the axis aforesaid for the purpose described.

9. Apparatus for exercising the muscles of the eyes substantially as described with reference to the accompanying drawings.

Dated this 6th day of September, 1932.

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Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1933.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

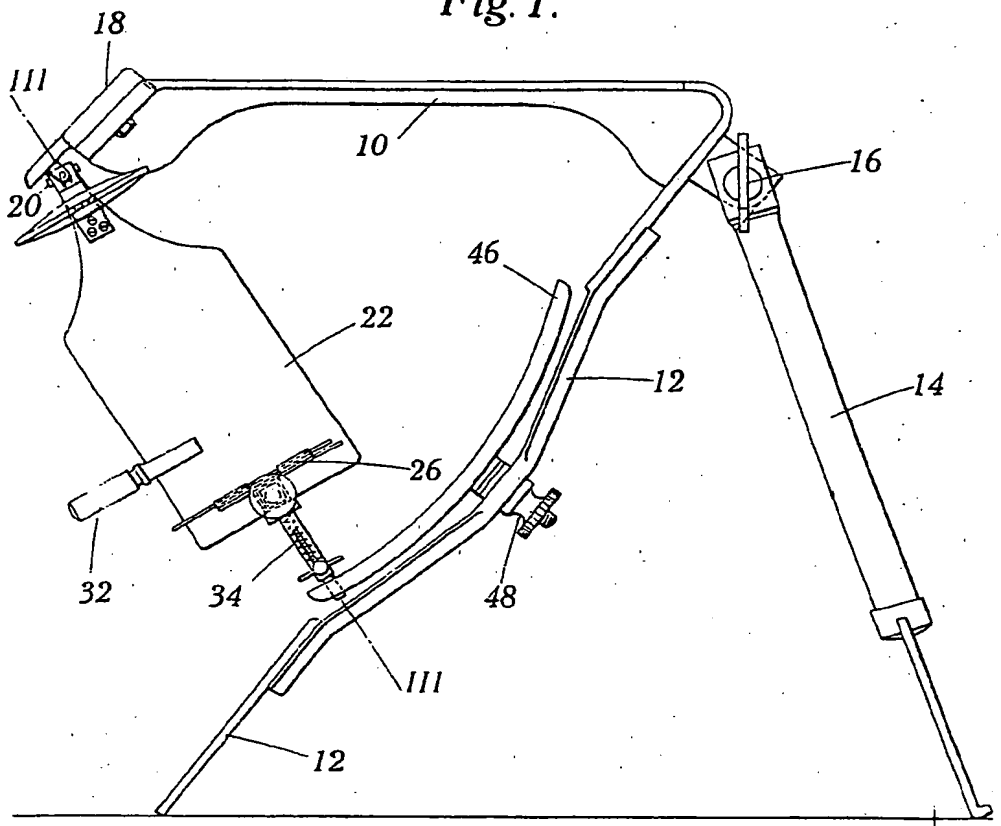


Fig. 2.

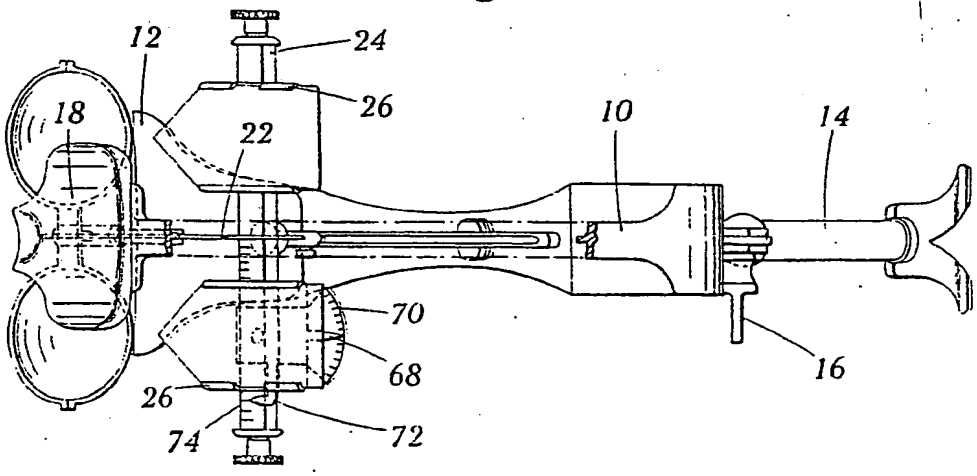


Fig. 3.

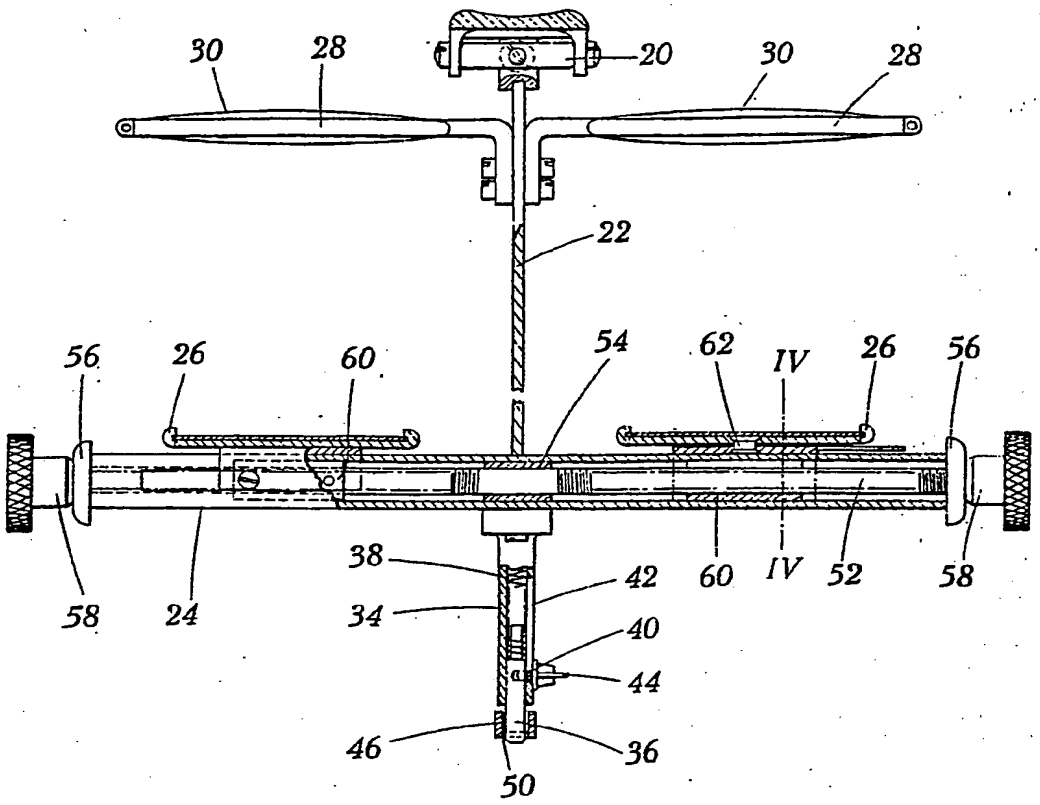
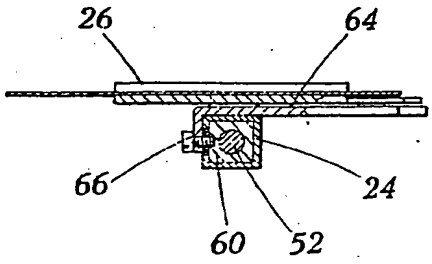


Fig. 4.



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388,200 COMPLETE SPECIFICATION

Fig. 1.

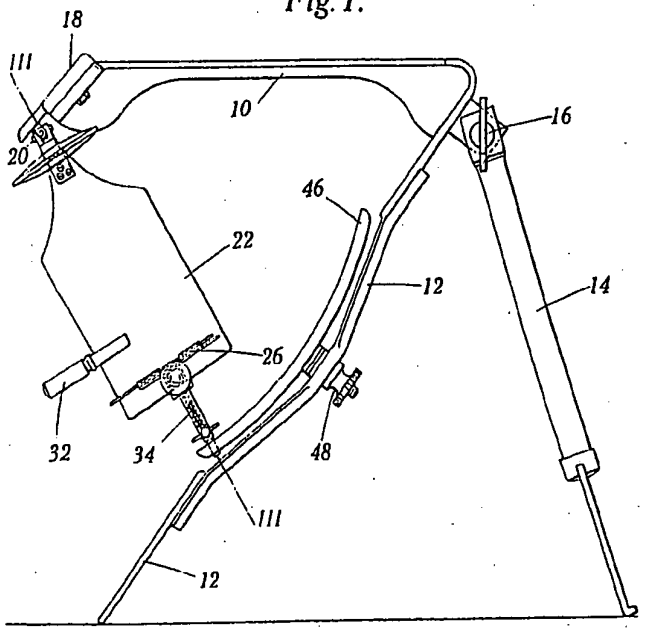


Fig. 2.

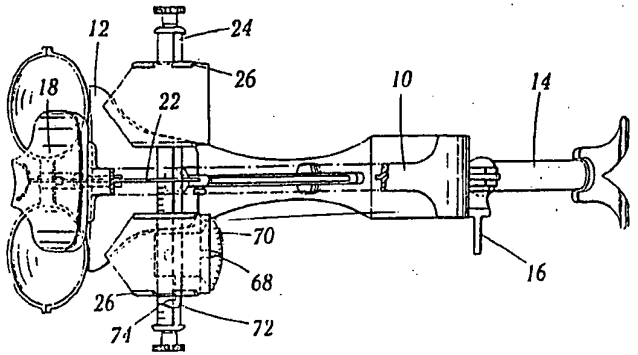


Fig. 3.

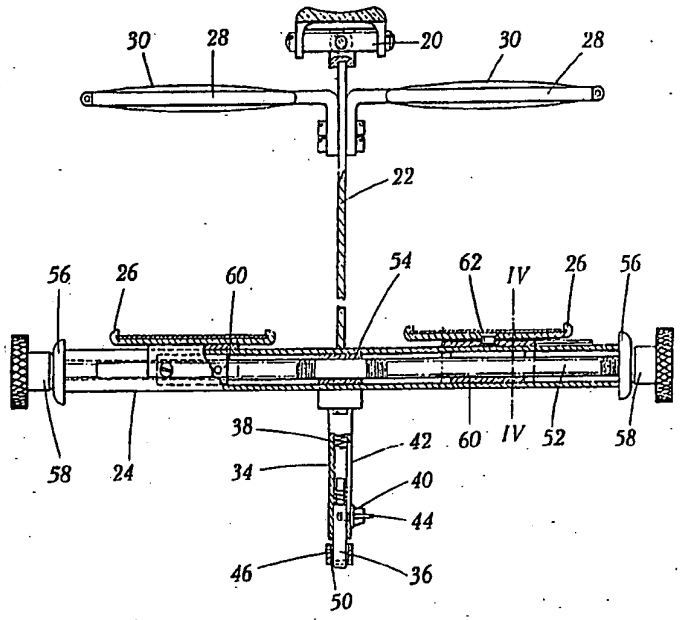
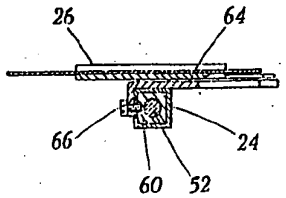


Fig. 4.



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